

# Design Methodologies and to Combat Radiation Induced Corruption in FPGAs and SoCs, Phase I

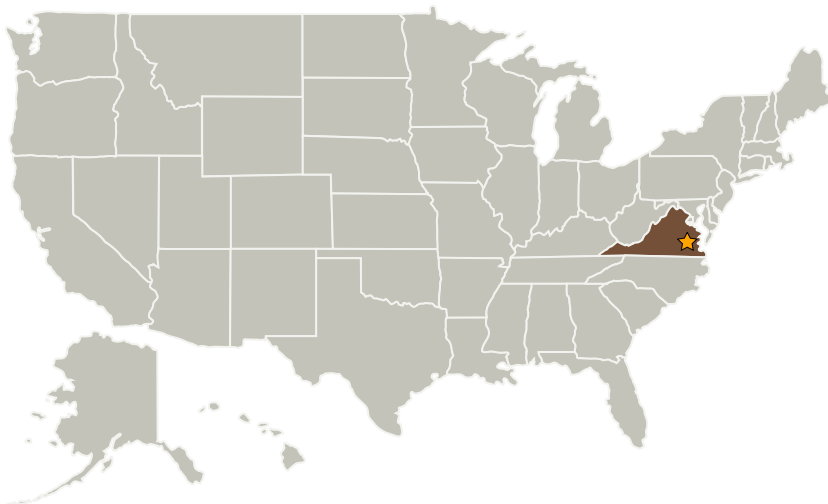
Completed Technology Project (2009 - 2009)



## Project Introduction

Traditional radiation hardened by process (RHBP) and radiation hardened by design (RHBD) techniques have seen success in mitigating the effects of radiation induced corruption, but are often cumbersome, slow and expensive. Current RHBP hardening techniques include foundry processing methods which take place at the manufacturing level such as the use of radiation resistant device packaging, radiation doping, and one-time programmable architectures. To date, RHBP approaches are often unavailable, prohibitively expensive, or too far behind the state of the art for many designers, forcing them to investigate RHBD techniques. RHBD design methods attempt to mitigate the effects of radiation by integrating principles of redundancy, error correction, and self-testing at multiple levels of the design, including the physical layout of a system function, the programming of the device, and the software running on the device. Traditional RHBD methods are often flawed when implemented on modern FPGA devices due to unique device architectures and supporting vendor CAD tools. Luna Innovations Incorporated proposes to develop susceptibility metrics and innovative RHBD methods to minimize the vulnerabilities of reprogrammable FPGAs in radiation prone environments. Luna will combine these developments into Luna PAR, a software program that optimizes designs for radiation hardening.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Luna Innovations, Inc.	Supporting Organization	Industry	Roanoke, Virginia

## Primary U.S. Work Locations

Virginia

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX10 Autonomous Systems
  - └ TX10.1 Situational and Self Awareness
    - └ TX10.1.4 Hazard Assessment